

NATIONAL HISTORIC LANDMARK NOMINATION

NPS Form 10-900

USDI/NPS NRHP Registration Form (Rev. 8-86)

OMB No. 1024-0018

LYNCH QUARRY SITE

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United States Department of the Interior, National Park Service

National Register of Historic Places Registration Form

1. NAME OF PROPERTY

Historic Name: Lynch Quarry Site

Other Name/Site Number: Lynch Knife River Flint Quarry, 32DU526

2. LOCATION

Street & Number: [REDACTED]

Not for publication: X

City/Town: [REDACTED]

Vicinity: X

State: North Dakota

County: Dunn Code: 025

Zip Code: [REDACTED]

3. CLASSIFICATION

Ownership of Property

Private: X

Public-Local:

Public-State:

Public-Federal:

Object:

Category of Property

Building(s):

District:

Site: X

Structure:

Number of Resources within Property:

Contributing

 buildings

1 sites

 structures

 objects

1 Total

Noncontributing

 buildings

 sites

1 structures

 objects

1 Total

Number of Contributing Resources Previously Listed in the National Register: N/A

Name of Related Multiple Property Listing: N/A

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4. STATE/FEDERAL AGENCY CERTIFICATION

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this ____ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ____ meets ____ does not meet the National Register Criteria.

Signature of Certifying Official_____
Date_____
State or Federal Agency and Bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria.

Signature of Commenting or Other Official_____
Date_____
State or Federal Agency and Bureau**5. NATIONAL PARK SERVICE CERTIFICATION**

I hereby certify that this property is:

- ____ Entered in the National Register
____ Determined eligible for the National Register
____ Determined not eligible for the National Register
____ Removed from the National Register
____ Other (explain): _____

Signature of Keeper_____
Date of Action

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6. FUNCTION OR USE

Historic: INDUSTRY/PROCESSING/EXTRACTION
COMMERCE/TRADE

Sub: extractive facility
trade (archeology)

Current: LANDSCAPE
AGRICULTURE/SUBSISTANCE

Sub: Unoccupied Land
Agriculture

7. DESCRIPTION

ARCHITECTURAL CLASSIFICATION: N/A

MATERIALS: N/A
Foundation: N/A
Walls: N/A
Roof: N/A
Other: N/A

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Summary

The Lynch Quarry Site (32DU526) is a precontact archeological site situated [REDACTED] in central western North Dakota [REDACTED] and includes a stunning display of precontact quarry pits easily dramatically defined across the landscape. The quarry is nationally significant as the type site for the distinctive Knife River Flint (KRF). Precontact distribution of KRF reaches as far as southern Ohio to the east, the Texas Panhandle to the south, the Rocky Mountains to the west, and southern Canada to the north (Figure 3). Analysis has revealed that the intensity of extraction activities at the quarry and, in turn, distribution of the raw material, peaked twice in precontact times: the first in the Paleoindian Period and the second in the Middle Plains Woodland Period, however, KRF was used continuously throughout precontact times and its use diminished significantly during the historic period and thus the period of significance of the property is 11,000 BCE to 1600 CE.

The property meets Criterion 6 for National Historic Landmark (NHL) nomination because it has yielded and may be likely to yield nationally significant information of major scientific importance. The Lynch Quarry Site was a key source of lithic materials for thousands of years over a large area of the United States. Lithic material such as KRF was essential for human survival and provides evidence of a widely established trade network. This quarry served as a “supermarket” for quarrying, removing, and exporting materials to off-site workshop areas before long distance travel. Therefore, the property can provide nationally significant information about the role of this lithic material in tool production, subsistence strategies, seasonal rounds of individual Native American groups, and trade relations between groups throughout North America during these periods. Several themes under the NHL thematic framework apply to the property, including *Peopling Places*, *Developing the American Economy*, *Expanding Science and Technology*, and *Transforming the Environment*. Multiple avenues of research can be explored using the Lynch Quarry Site, among them migration and subsistence patterns; local, regional, and national interactions of native populations; changing technology over time and space; and adaptations to environmental changes.

Describe Present and Historic Physical Appearance.Environmental Setting

The Lynch Quarry Site lies [REDACTED] in Dunn County, North Dakota (Figure 1). “The Knife River is believed to have received its name [historically] for the high quality flint found near its source from which Indians made their stone knives” (Loendorf et al. 1984:15). However, the biggest, most extensive deposits of KRF [REDACTED] of the Knife River [REDACTED]. [REDACTED]. The surrounding terrain is characterized by rolling hills to plains with local relief ranging from 300 to 500 feet (90-150 meters) (Bluemle 2000:4). The area is transitional between the Missouri River Valley to the north, plains to the south and west, and the badlands, characterized by rugged eroded buttes and mesas cut by deep valleys, to the west. Typically, seasonal temperatures vary widely, with daily high temperatures from -46°F (-43°C) in January to 107°F (42°C) in July. The growing season lasts from mid-May to late September (Wright et al. 1982:3, 141).

“The early prehistoric landscape would have been quite different [than today’s]. At the retreat of the glaciers the [area] would have had more water and a cool moist climate” (Loendorf et al. 1984:6). Beginning in the Paleoindian Period, the climate of this region was more mild, both in summer and winter, shifting to a more arid climate around 7,500 BCE (SHSND 1990:3.25), before turning to the climatic conditions we are used to today between 5,700 and 1,200 BCE (Kay 1998:26).

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The general landform at the site has not appreciably altered in appearance, with the elevation of the site set well above the floodplain [REDACTED]. It is likely, as it is now, that few trees would have been visible from the site, which occupies wide-open grasslands leading to the water's edge.

Site Description

The Lynch Quarry Site measures approximately two miles east-west by one mile north-south and covers approximately 690 acres of land (Ahler 1986, Loendorf et al. 1984:11). The site is located at the center of a large archeological district (Figure 2), for which the Keeper of the National Register of Historic Places provided a formal determination of eligibility at the national level of significance in the 1980s. Due to landowner disagreements over federal recognition of the district, it was never formally nominated at that time. The sentiments of the landowners have changed considerably over the ensuing 25 years and now the landowners wish to see the property formally recognized. While the entire district is considered significant for its historic function and resource for the National Register, due to poor integrity of the surrounding sites, this National Historic Landmark nomination form is specifically for the well preserved Lynch Quarry Site (32DU526) as the type site of KRF, and the centerpiece of that district.

The Lynch Quarry Site consists of depressions of various sizes and shapes in the terrain, following the terrace line [REDACTED] (Photos 1, 2, and 3). The pits range in size from less than half a meter to over two meters deep, and have diameters of up to five meters. On average, there are 25-30 pits per acre within the site area (Loendorf et al. 1984). The principal owners of the property, [REDACTED], protected the site by working with numerous scholars and researchers to define and manage the site as a whole. Disturbances to the site include plowing, cattle grazing, railroad construction across the [REDACTED] boundary, and historic underground mining. Collapsed coal mine shafts created large depressions 20-40 meters in diameter and 5-10 meters in depth in the western part of the site (Photo 4). Due to their large size, these historic mining depressions are easily distinguished from the precontact quarry pits. The historic mine shafts and other localized disturbances do not substantially affect the overall site integrity.

Currently, there are thousands of quarry pits visible on the site surface, while an unknown number of pits have been completely filled with sediment over the ensuing years and are no longer visible. Scattered across the site among the pits lay numerous large glacial boulders of igneous rock, used during precontact periods as anvils to break cobbles of KRF.

In the mid-1970s, a small portion of the Lynch Quarry Site was test excavated with a backhoe to cut a trench through several pits (Loendorf et al. 1976:22-25). One trench measured 15 feet long and bisected three quarry pits, creating a long, contiguous profile of the depth and breadth of the pits and showing how the surface expression of the pits corresponds to their subsurface profiles. A second trench revealed evidence of subsurface pits that did not create surface expressions, having been filled completely by sediment. The assumption is that there are more quarry pits with no surface expressions buried across the Lynch Quarry Site. At this point, the unexposed quarry pits are not at risk from natural degradation unless disturbed by agricultural or construction activities. As for the visible quarry pits, the risks are higher from natural degradation such as water, wind, and ice erosion, and by the effects of bioturbation caused by plant growth or animal activity.

Establishing the Site Boundary and Artifact Distribution

The site boundary for the Lynch Quarry Site was established on several factors, but it was primarily set on the natural deposition of Knife River flint in its geologic context. The depth of deposits, in general, corresponds to the depth of Knife River flint-bearing sediments. The flint-bearing deposits can be found from one to three

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meters below the current ground surface across the terrace above Spring Creek (Figure 4). Loendorf et al. (1976) report the following:

“One trench about fifteen meters long was placed to bisect two adjacent pits and a part of a third pit depression. In this trench it appeared that subsurface pitting indeed corresponds to the surface locations of depressions. A second backhoe trench was placed through the center of an isolated depression on the edge of a major quarry area. Here, evidence of pits in the profile indicates that several pits have been refilled, leaving little correspondence between surface and subsurface features. In both trenches, Knife River flint cobbles are found in geologic context as part of broad alluvial sand deposit. In all parts of this quarry, it appears that digging conditions were not difficult, with aboriginal pits extending from one to two meters into the soft sand and penetrating one or more of the intermittent flint bearing gravel lenses.” (Loendorf et al. 1976:22-25)

The [REDACTED] site boundaries are marked by the edge of the terrace landform. The terrace holds the deposits of glacial material where the Knife River flint cobbles are concentrated. The [REDACTED] boundary is set by the extent of visible quarry pit activity and distribution of surface artifacts. As one travels [REDACTED] in this area the flint-bearing sediments are found at increasing depths. Quarrying would have been much easier in the [REDACTED] portion of the site, near the terrace edge.

The [REDACTED] boundary of the Lynch Quarry Site is bordered by site 32DU528, following the landform edge. While the surface archeological deposits are nearly continuous between the two sites, the boundaries are set here to separate the sites based on depositional history. The Lynch Quarry Site (32DU526) exhibits archeological deposits to a maximum depth of three meters while site 32DU528 is much shallower, extending only 35 centimeters below surface (Loendorf et al. 1984:20).

The quarry pits and associated chipped stone debris cover the entire site. Discrete activity areas, as opposed to individual quarry pits within the site, have not been identified to date. Nearby sites that have been extensively tested, such as 32DU508, have workshop and domestic/camp areas associated with the quarry pits (Ahler et al. 1983, Ahler 1986:24, Ahler et al. 1991).

Precontact and Historic Appearance

During the Paleoindian Period, [REDACTED] was wider and filled with melt water from receding glaciers. Vegetation included pine trees, short grass varieties, and other tundra species (Kay 1998:21-23). Megafauna, such as *Bison antiquas*, roamed the prairie. The site would have been on the shores of [REDACTED] with little or no soil covering the sand and cobble deposits making it easy to extract the flint cobbles from this area. As the glaciers retreated further and conditions stabilized, [REDACTED] dwindled to a stream. The terrace deposits of sand and cobbles were covered with sediment, and vegetation grew to cover the stream margins again. The appearance of the Lynch Quarry Site has changed little since climate stabilization in the early Archaic Period. From then on, prairie grasses have dominated the region and are presently growing on the site. While the pits were actively quarried, vegetation was removed and spoil piles would have surrounded the pits. These spoil piles are visible today as raised lips surrounding the pits. Most of the features at the Lynch Quarry Site have been overgrown with grass, making some of the pits difficult to see when the grass is at its tallest. The surrounding landscape has largely been adapted to farming and ranching, with homesteads dotting the prairie. Over time, the [REDACTED] channel meandered toward the site, following the base of the terrace, with its course changing as portions of the channel filled with silt (Bluemle 2000:53).

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Site Type

The Lynch Quarry Site is an extensive precontact lithic material quarry area. The site shows little or no evidence of long-term occupation, suggesting it was utilized more as a “supermarket” of KRF for quarrying, removing, and exporting the stone to off-site workshop areas to be reduced before undertaking long-distance travel. Based on diagnostic lithic tools found at the site and over a large geographic range, it is clear that precontact groups used the area for thousands of years, extracting usable lithic material from the pits for individual group use as well as for trade. There are numerous quarry sites in the immediate area, but none is as well preserved or as extensive (Ahler 1986:Figure 3). The quarrying activities likely occurred alongside domestic activities as groups camped nearby while extraction efforts took place. The extent of the relationship between the Lynch Quarry Site and other sites in the KRF primary source area is unknown at this time; however, some connection to surrounding sites is certain. Primary evidence of quarrying activities on the site include the pits themselves, anvil stones near pit edges, tool flaking and finishing implements made from bison bone, stone tools and countless pieces of modified KRF.

Associated Features and Artifacts

Quarry Pits. The quarry pits found within the Lynch Quarry Site vary in size and shape over the prairie landscape (Photos 5, 6, and 7). The quarry pits range from oblong to circular depressions measuring “less than one-half meter to over two meters in depth and up to five meters in diameter. There are 25-30 pits per acre over most of the site” (Loendorf et al. 1984:11). Many other pits may potentially exist below the surface, either buried by natural sedimentation or filled with the backdirt of later, adjacent quarried areas.

Anvil Stones. Large glacial boulders were placed irregularly near many quarry pits across the site (Photos 8 and 9). More than 50 of these boulders were used for initial bipolar reduction of freshly quarried KRF cobbles for easier transport off-site. A piece of KRF (Photo 10) would be placed on a boulder anvil and then sharply struck with a hammerstone to remove a large flake before rotating the cobble 180° and striking the cobble again (Ahler 1986:54, Ahler 1994:26-27). Thus two blows (or force application) from opposite directions would be apparent on the KRF cobble or core. This bipolar reduction technique was utilized at nearby site 32DU508, where approximately 45,000 flakes were found surrounding such an anvil boulder in a one-meter square, ten-centimeter deep area (Loendorf et al. 1984:12; Ahler 1986: Figure 20b). Reduction techniques and estimates of cobble quantity and size can be gathered from such localized activity areas, giving researchers useful data concerning quarrying activities.

Bone Tools. Bison bone was commonly used as a component in composite tools and some of these tools have been found at the Lynch Quarry Site. One elk antler tine was recovered from the site. Use-wear analysis shows that it was used for removing flakes from cores and early stage manufacturing of stone tools (Photo 11). A second bone tool, made from a split bison rib fragment, was used during stone tool finishing work to make notches in the completed tool if it was to be hafted or to use pressure flaking to remove small areas of thickness across the middle of the tool (Photo 11). A third recovery, a bone awl, was used to puncture holes in leather or hides (Photo 12). In other sites in the area, bone tools including hafted scapulas and utilized long bones were used as digging implements to remove the sandy matrix out of the pits. It is possible that similar implements may be present at the Lynch Quarry Site, and further investigations may recover more artifacts, which would lend more detail to the technological record of the past occupants (Ahler 1986: Figures 30 and 31).

Lithic Tools. The [REDACTED] family has recovered numerous KRF tools from the site, most of them as surface finds with a small portion brought to the surface from rodent activity. Non-diagnostic tools recovered from the site include a graver, several hafted knives (most having been heavily utilized and reworked, (Photo 18), scrapers, a drill (Photo 17), large blanks, numerous cores and core fragments, and non-KRF hammerstones. The diagnostic

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tools recovered from the site include core and blade technology (Photo 13), commonly used during the Paleoindian period, as well as projectile points. The midsection from one point has characteristics consistent with flaking patterns and proportions of Paleoindian projectile points (Photos 14 and 15). A basal fragment of a Duncan point, as well as two McKean projectile points which were typically utilized during the McKean Complex period, represents the Middle Archaic. Several Pelican Lake projectile points recovered from the Lynch Quarry Site emphasize the increased presence of people in the Late Archaic period (Photo 16). Plains Woodland period artifacts include several projectile points in the Besant/Samantha style (Photo 19). Plains Village period projectile points include both Prairie Side-Notched and Plains Side-Notched styles (Photo 20). While no diagnostic artifacts have been recovered from the Early Archaic period, there is speculation that the site was continuously utilized throughout time and thus, it is likely that Early Archaic artifacts may potentially be recovered during excavations.

Lithic Debitage. Lithic debitage resulting from the reduction of KRF cobbles litters the site surface, both within and around the quarry pits. Analysis of the debitage can tell researchers what types of reduction strategies were used at the quarries. Reduction techniques include freehand core reduction, prepared core reduction, cobble testing or bipolar reduction. Associated with the debitage are usually hammerstones, or stones that were used to strike off pieces from the cores. The wear-analysis on such tools can be useful to researchers in determining the reduction sequences. Evidence for changes in reduction strategies through time can potentially provide support for inferences about cultural adaptations to lithic material availability, shifts in the number of trips to the quarries by groups and lengths of stays, shifts from open-access to controlled-access quarrying, and importance of the stone in trade networks throughout the nation. While many quarry sites in the area can relate this information to researchers, the Lynch Quarry Site is unique in its extraordinarily well preserved deposits. Also, the vast size of the Lynch Quarry ensures that large portions of the site can remain intact for future research as analytical shifts create new techniques for data recovery.

Archeological Dating. The nature of the Lynch Quarry Site and adjacent sites, with evidence for removal of staggering amounts of high quality lithic material, suggests that Native American groups used Knife River flint throughout the precontact period, from the Paleoindian Period, 11,000 BCE, through the early Historic Period 1600 CE. General dates for the four basic cultural periods of precontact times in the northern Great Plains are as follows: Paleoindian: ca. 11,000 BCE to 6,000 BCE; Archaic: ca. 6,000 BCE to 1 CE; Woodland: ca. 1 to 1000 CE; and Plains Village: ca. 1000 to 1600 CE. As noted in the *Lithic Tools* section above, all temporal periods except the Early Archaic are represented at the Lynch Quarry Site. However, dating quarry sites is problematic for several reasons. First, as quarrying has taken place repeatedly over thousands of years, contexts for individual time periods are sometimes mixed, with pits reworked and revisited. Second, radiocarbon dates in this area are often imprecise due to lignite (coal)-based sediment contamination with cultural strata. Radiocarbon dates from contaminated samples can be many thousands of years older than the accepted time range of human occupation. Lastly, the paucity of diagnostic tools around the quarry sites does not provide a complete temporal record of area. Typologies for projectile points can be used for relative dating; however, in the quarries, lithic material was extracted in large, primarily unworked pieces, and tool finishing took place off-site. That being said, diagnostics made of this distinctive lithic material, when found elsewhere, can be attributed to the quarry area in many cases, and can provide an idea of the time periods when the source area was most heavily used. As Early Archaic projectile points made from KRF have been found elsewhere, it is likely that the absence of this time period from the [REDACTED] collection is a product of formation processes and not an absence of humans utilizing the quarries during this time.

Far-ranging use of KRF during the Paleoindian Period is evident from Scottsbluff points found near Helena, Montana, and an Agate Basin point found at Seeley Lake, Montana, west of the Rocky Mountains, approximately 700 kilometers from the quarry area (Loendorf et al. 1984:13-14). As documented by Loendorf

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et al., KRF Clovis points have been found in Saskatchewan, Manitoba, and Wisconsin, while Folsom points have been found as far away as Wyoming (although the majority of KRF Folsom points have been found closer to the quarries)(Ahler et al. 2002:110).

In a dramatic shift from the Paleoindian Period, the distributional range of KRF during the Archaic Period (6,000 BCE to 1 CE) contracted to an approximate 200-kilometer radius (Loendorf et al. 1984:15). However,

After the Archaic Period, beginning “[a]bout 2000 years ago [around 1 CE], when Woodland cultures were living in the eastern United States, KRF was again widely used for the production of chipped stone artifacts. Near the quarries, the debitage in Besant culture sites is eighty to one hundred percent KRF...KRF is common in Sonota sites [and] Sonota is also believed to represent the culture which linked the Hopewell culture of eastern North America to the KRF quarries” (Loendorf et al. 1984:15, see also Neuman 1975).

Other mortuary and non-mortuary artifacts made of KRF found in small but compelling amounts in western Illinois are held as evidence of the extensive trading of this high quality lithic material (Conrad 2004:174-175). Conrad finds that the KRF was “much more likely to have been used for mundane artifacts than for special burial items” (Conrad 2004:178). The Woodland and later village cultures along the Missouri River in both North and South Dakota used KRF nearly exclusively until the early 1800s. There is evidence for trade of KRF in the Protohistoric and early historic periods when the lithic material is thought to have been transported down river into South Dakota (Wood 1974:1-16).

Site Formation Processes. The Lynch Quarry Site lies [REDACTED], out of the modern floodplain. Prior water levels might have impacted the terrace; however, the age of the terrace is likely late Pleistocene and therefore would have only flooded in early Paleoindian times when use of the quarry area was just beginning (personal communication, geoarcheologist Michael McFaul 2008). Minor erosion is evident in a small portion of the cutbank along the southern site margin. On the majority of the site, a layer of modern soil blankets the quarry pits preserving the precontact deposits. Due to the [REDACTED] family’s preservation efforts, the site has suffered few modern impacts with light cattle grazing, rodent activity, and mowed visitor paths being the only observable disturbances.

Noncontributing Components

The only noncontributing component within the Lynch Quarry Site boundary is a historic farm/ranch and associated artifact scatter (Figure 4). This farmstead lies in the north-central portion of the site and consists of seven remnants of structural features including six rectangular depressions and/or foundations and one windmill. Some farm machinery parts and bottle glass were found near the foundations along with two license plates (dated 1925 and 1933). While this historic farmstead may be eligible for the National Register under another context, this component of the property does not contribute to the site’s national significance as it is described here.

Archeological Integrity

The Lynch Quarry Site has a high degree of archeological integrity. “[T]he Lynch Quarry is the largest KRF quarry known...There is no evidence for other larger or more complete KRF quarries anywhere in North Dakota” (Loendorf et al. 1984:10). Further, there is no evidence for a larger, more complete KRF quarry anywhere else in the United States. The majority of the 690-acre site is an intact archeological record that features precontact quarrying efforts over the last 13,000 years. A two-track road provides access to the site,

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cutting across [REDACTED] an area of less densely concentrated pits. The two-track road has impacted the site only to a depth of about 10 centimeters, with its use closely monitored by the [REDACTED] family. As the depth of cultural deposits is up to three meters, this shallow disturbance is of negligible significance.

Historical use of the area, unrelated to KRF quarrying, has impacted the precontact component of the site to some extent. The remnants of the historic farmstead, located on the northern margin of the site, are mixed with lithic debitage, indicating that precontact cultural deposits were impacted by construction episodes in the past. The farmstead remnants now stand in a hayfield, cultivated at least since 1982, when this portion of the site was recorded. Cultivation of this field impacted precontact cultural deposits to an unknown depth. However, the cultivated portion of the site comprises less than 70 acres, or about 10 percent of the total site area, which has minimal effect on the condition of the site overall. In the southwestern portion of the site, collapsed underground lignite mine shafts have resulted in approximately 25 large sinkholes. The railroad bed crossing the extreme southern margin of the site impacted approximately four acres of land, with intact quarry pits to the south of the bed. These disturbances affect only a small portion of the Lynch Quarry Site and, overall, the property retains excellent integrity over the majority of the site area.

Archeological fieldwork on this site has been limited due to the strong desire by researchers to protect this valuable cultural resource. Testing has been restricted to two trenches, one 15 meters long and one 10 meters long, cut through four surface-visible quarry pits to determine their subsurface profiles (Loendorf et al. 1976:22). Both trenches were excavated to a depth of approximately two meters.

Previous Investigations and Documentation of the Lynch Quarry Site

The first reference to the Knife River flint quarry area is found in Lewis F. Crawford's 1936 *History of North Dakota*. Crawford discusses this region as important to supplying precontact peoples with sufficient quantity and quality KRF. In Willey's *Introduction to American Archaeology: North and Middle America* (1966), it is noted that KRF was commonly used for projectile points through Woodland, Plains Village, and Paleoindian periods.

The first documented visit to the Lynch Quarry Site by researchers was in 1970 when geologists Clayton, Bickley, and Stone made the initial effort to identify quarry sites using a combination of aerial photographs and field visits. They first encountered the site on a field reconnaissance for Pleistocene geology of Dunn County in 1968 (Clayton et al. 1970:284). "There is some confusion about the name Knife River flint because no type area has ever been designated. For this reason the largest and most characteristic quarry [i.e., Lynch Quarry] is here designated the type area for Knife River flint" (Clayton et al. 1970:284).

Archeological research and fieldwork at the Lynch Quarry started in earnest in 1975 when Richard Fox, John Logan, and Homer Hruby working for the University of North Dakota conducted an archeological pedestrian survey of the area. "The work was designed to locate and investigate the archeological sites in an area proposed by the Natural Gas Pipeline Company of America for a coal gasification complex with associated lignite deposits" (Loendorf et al. 1984:8). In an attempt to gather information about the quarry pit structures and depths, two trenches were excavated within the Lynch Quarry Site boundary. One trench measured 15 meters long and one was approximately 10 meters long; both were excavated to a depth of approximately two meters. Based on this limited testing, Loendorf et al. (1976:71) said the "site is extremely important not only in terms of aboriginal quarrying activities but also as to the length of time it has been utilized. The landowner has collected artifacts from the site which, based on comparable typology, span a time period of over 5,000 years...Preservation is of the utmost importance."

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In 1980, the Bureau of Land Management (BLM) contracted Historical Research Associates of Missoula, Montana, to conduct a sample survey of the area to help put the newly recorded sites in a regional archeological context (Loendorf et al. 1984) for management of non-federal lands overlying subsurface mineral deposits. The Lynch Quarry Site boundary was expanded at this time and additional quarry pits were identified. After this fieldwork, the BLM (Dickinson District Office) submitted a package of information proposing a Knife River Flint Quarry District, with the Lynch Quarry at its heart. The Keeper of the National Register declared in January 1982 that the proposed district was eligible for the National Register. The Keeper recommended further archeological work to locate additional sites and to record more precise boundaries for the already known sites (Loendorf et al. 1984:4). This work was done in the summer of 1982 through another pedestrian survey conducted by the University of North Dakota by means of a Historic Preservation Fund matching grant awarded by the State Historical Society of North Dakota. The goal was to identify site boundaries through intensive survey. As a result, the Lynch Quarry Site was expanded to its current size, totaling 693 acres.

In 1984, Loendorf, Ahler, and Davidson compiled *The Proposed National Register District in the Knife River Flint Quarries in Dunn County, North Dakota*. This document is an excellent summary of the archeological work conducted in the region. Unfortunately, nomination of the District languished due to negative perceptions among some affected landowners 25 years ago, but the proposed District boundaries are currently thought to encompass the core archeological record of precontact Knife River flint quarrying and modern landowners support the nomination. The Lynch Quarry Site (32DU526) lies within the District boundaries, and is the central locus around which additional sites were added or removed from inclusion in the proposed District. Archeological excavations were conducted in nearby sites to avoid destroying any additional portions of the Lynch Quarry Site, with researchers understanding the importance of preserving the largest and most notable quarry site in the region, and indeed the nation.

Since 1984, [REDACTED] have allowed visitors and researchers to view the quarry site, providing information and access for those who are interested. All of the artifacts collected during the fieldwork were returned [REDACTED]. Today, the [REDACTED] have an extensive collection, some of which has been documented in this nomination form.

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8. STATEMENT OF SIGNIFICANCE

Certifying official has considered the significance of this property in relation to other properties:

Nationally: X Statewide: Locally:

Applicable National

Register Criteria:

A B C D X

Criteria Considerations

(Exceptions):

A B C D E F G

NHL Criteria:

6

NHL Theme(s):

I. Peopling Places

3. migration from outside and within

V. Developing the American Economy

1. extraction and production

2. distribution and consumption

3. transportation and communication

4. workers and work culture

6. exchange and trade

VI. Expanding Science and Technology

1. experimentation and invention

2. technological applications

4. effects on lifestyle and health

VII. Transforming the Environment

1. manipulating the environment and its resources

2. adverse consequences and stresses on the environment

Areas of Significance:

Archeology, prehistoric

Period(s) of Significance:

11,000 BCE – 1600 CE

Significant Dates:

N/A

Significant Person(s):

N/A

Cultural Affiliation:

Paleoindian, Archaic, Woodland, Plains Village

Architect/Builder:

N/A

Historic Contexts:

I. Cultural Developments: Indigenous American Populations

1. The Early Peopling of North America

2. Archaic Adaptations of the Plains

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Summary

The Lynch Quarry Site is nationally significant because of its uniquely extensive and intact archeological deposits that are more clearly defined than any other KRF (Knife River Flint) quarry site in the United States (Ahler 1986:106-107). This quarry has been used throughout precontact times, but most notably during the Paleoindian Period and again in the Middle Woodland. Although the property has not been extensively excavated, the information that has been recovered from sites outside the main quarry area, suggests that the better-preserved Lynch Quarry Site has incalculable research potential. Preservation of the Lynch Quarry Site, as the KRF quarry type-site, is essential to future research. Additionally, the Lynch Quarry Site has one element most quarry sites in the area and across North America lack: surface expressions of thousands of quarry pits, easily defined and noticed across the landscape. The dramatic impact of this expression of precontact human work in obtaining KRF can be found nowhere else. Interpretation of archeological sites generally needs to rely on reconstructions of the past based on the post-fieldwork analysis, but the precontact history of the Lynch Quarry site has been preserved and easily viewed, bringing the past to life.

The property meets Criterion 6 for a National Historic Landmark (NHL) nomination under four NHL thematic frameworks. The primary thematic framework the Lynch Quarry applies to is *Developing the American Economy*. Relevant secondary themes are *Peopling Places*, *Expanding Science and Technology*, and *Transforming the Environment*. The Lynch Quarry Site is the type-site for precontact KRF procurement strategies in the northern Great Plains and was arguably the specific source for a significant proportion of KRF tools throughout a broad geographic range. The site's stratigraphic data indicate changes in these strategies over thousands of years, which reflect changes in social organization, land use patterns, climatic shifts, and subsistence foci throughout the Plains. Under the theme of *Developing the American Economy* the topics of extraction and production, distribution and consumption, transportation and communication, workers and work culture, and exchange and trade are all applicable. Under the theme of *Peopling Places*, the topic of migration into and out of the area is a nationally significant topic. Under *Expanding Science and Technology*, applicable topics include experimentation and invention, technological applications, and effects on lifestyle and health. For the theme of *Transforming the Environment* research agendas include manipulating the environment and its resources, adverse consequences and stresses on the environment, and protecting and preserving the environment.

State Significance of Property, and Justify Criteria, Criteria Considerations, and Areas and Periods of Significance Noted Above.**Cultural Contexts and Temporal Associations**

Two major temporal periods represented at the Lynch River Quarry Site were the Paleoindian Period and the Middle Plains Woodland Period. People living during the Paleoindian Period left few signatures across the landscape because Paleo-period activity is defined by high mobility and small group populations relative to later time periods. Features, such as hearths, and perishable components of tools, such as the spear shafts and the sinew used to attach them, are rarely recovered. Stone tools and the remnants of their manufacture are the most durable and lasting artifacts. Thus, knowledge of how people traveled across North America collecting and transporting lithic material for their toolkits is vital to understanding migration patterns of Paleoindian people. Evidence shows a resurgence of KRF quarrying activity during the Middle Plains Woodland Period. Datable materials from this period have been recovered at nearby sites as well as the Lynch Quarry Site itself. Additionally, Knife River flint tools and preforms have been recovered from Hopewellian deposits in Ohio indicating the presence of an established trade route across the continent during the Middle Woodland period (DeBoer 2004:91-92). These two major episodes of quarrying, as well as smaller forays into the pits throughout

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precontact times, are chronicled in the archeological record. At the Lynch Quarry Site, that evidence remains intact, awaiting researchers to study and interpret it, and to push archeological research in new directions.

To ensure the preservation of this invaluable record, the Lynch Quarry Site has not been extensively excavated. Instead, it has been analyzed based on surface collected diagnostic projectile points and work conducted on smaller adjacent sites. One of these smaller sites, Site 32DU508, was excavated, with the aid of grant funding, to make some preliminary determinations of how quarry sites are structured. The work also identified potential problems or issues specific to studying KRF quarries. "The purpose of the analysis program was to serve as a pilot study for analytic procedures to be used with artifacts from other sites in the KRF source area" (Ahler 1986:2). Thirteen sites near Lake Ilo, just outside the boundaries for this property, were excavated during a period when the lake was drained for dam reconstruction. Due to the imminent reflooding of the area, the sites were extensively excavated as part of a salvage program, and information from that study serves as a second source of proxy data for the Lynch Quarry Site. Several tools collected by the landowners of the Lynch Quarry Site are diagnostic of the Paleoindian Period, thus implying the data from nearby sites are similar in nature to the Lynch Quarry. By proxy, the data collected from 32DU508 and other excavations in and around Lake Ilo can be used to positively infer the importance of the Lynch Quarry Site without damaging the intact deposits that lie within its boundaries.

Even with the pilot study at 32DU508 and excavations at sites around Lake Ilo, the task of deciphering the chronological context for the Lynch Quarry area is in its infancy. Inferences about chronology from previous studies are based on analysis of paleosols and geomorphic formation processes, and are supplemented with limited numbers of diagnostic artifacts and features. Among the tools and ceramics recovered from the pilot study, one bison scapula tool was radiocarbon dated between 1645 CE to modern. One ceramic vessel recovered from excavation dates tentatively to 1-1000 CE. In the older sediments, evidence of the "well-recognized high status of bifacial tools (particularly projectile points) approaching a symbolic art form in the Paleoindian cultures in the Plains" is seen (Ahler 1986:105).

The mega-sites (sub-divided into several smaller sites for analysis) found around and within the current location of Lake Ilo were dated based on radiocarbon analysis and diagnostic artifacts. Component "F" from mega-site 32DU954 had a sample from within the Leonard Paleosol with a radiocarbon age of $9,190 \pm 120$ years BP [7,190 BCE] (Williams 2000:39). From component "A" of mega-site 32DU955, 24 radiocarbon samples yielded an average date of 10,600 years BP [8,600 BCE] (Root 2000:49). Excavations at 32DU955, a known Folsom-age site, recovered numerous diagnostic projectile points and characteristic channel flakes, confirming the occupation date. In mega-site 32DU966 (Timpson 2000:33), Paleoindian artifacts were found in conjunction with the Leonard Paleosol. The deposits on site 32DU966, however, show erosion of the site surface prior to lake construction, and subsequent water erosion has conflated the stratigraphic levels, making analytic units difficult to parse out. All of the sites excavated near or in the Lake Ilo bed had conflated deposits and issues with erosion because of the construction of the dam.

In contrast, backhoe trenching at the Lynch Quarry Site revealed evidence for intact stratified deposits from quarrying efforts (Loendorf 1976:22-25). As seen in the trench walls during backhoe testing of the Lynch Quarry Site, two quarry pits have been completely covered by spoil material as well as natural sedimentation over the area, preserving the much older pits.

From the excavations at 32DU508, it is clear that prior to 3,000 BCE, the technological focus was on biface production with activity centers clearly segregated between the quarry areas and adjacent workshops. Assemblages from later periods point to a shift to a much more haphazard use of space around the quarry and wasteful reduction strategies. The shift to wasting stone and the lack of task-specific activity loci is an

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unexpected and fascinating trend speaking to the shifts in the demand for the lithic material and variation in the social organization of quarrying activities (Ahler 1986:108). The archeological record holds these signatures of change in social and technological characteristics. Later quarrying episodes re-opened older quarrying pits or filled older pits with backdirt from adjacent diggings. Evaluating the components of the quarrying episodes apart is a challenge for researchers. Because of its exceptional preservation, the Lynch Quarry Site has the potential to yield important information about social and economic shifts through time as demand and supplies of KRF varied. More definitive chronological indicators could also be recovered from excavations at the Lynch Quarry Site, and preservation of such deposits for researchers is essential to the site's importance. Establishing a more detailed and accurate temporal framework for the area's precontact record will help develop an understanding of land use through time, help to answer how this resource's importance changed over time, and contribute to knowledge about why these changes occurred.

Quarrying technology was likely limited to sharpened digging sticks, honed bison bones, and stone digging implements used to dig the pits in the soft sand matrix, and scapula tools to scoop it from the pits (Ahler 1986:106). Based on the projected data from site 32DU508, Ahler estimates the effort expenditures.

“[An] estimated mean depth of 2.0 meters of spoil in [quarry] sites, [yields] a total soil volume of four million cubic meters. At the rate of one cubic meter per person day of effort, this yields a total effort of six million person-days. Over an 11,500 year period, this yields an average of 522 person-days effort devoted to KRF quarrying per year. While probably not very accurate, such computations do give a general perspective on the magnitude of KRF quarrying activities in the primary source area” (Ahler 1986:106).

Ahler, working in generalities, does not indicate how widely the effort expenditures would fluctuate over time. Much higher rates of quarrying were inferred for the Paleoindian Period and again in the Middle Woodland than in other time periods. Taking this into account, small group forays into the primary source area during spring, summer, and fall could be assumed during these peak temporal periods, or alternatively, large quarrying groups utilized the area in fewer but more intense seasonal rounds. While these data are projected for the district as a whole, the Lynch Quarry Site was at the epicenter of this precontact activity, being the target of a large portion of KRF quarrying efforts. It can be assumed, since high quality KRF remains in the Lynch Quarry Site, that the quarry remained a viable and reliable source of lithic material to Plains groups throughout precontact times, until the demand dwindled sometime after European contact (Lehmer et al. 1978:428, Smith 1972:62). The archeological record preserved at the Lynch Quarry Site has great potential to help refine these gross estimates of precontact KRF procurement and contribute to our knowledge of how KRF quarry sites were utilized.

The Lynch Quarry Site typifies KRF quarrying efforts. The intact archeological record found within the site boundaries is irreplaceable for future research into precontact lithic material acquisition. Abundant, high quality, easily accessed lithic material kept nomadic groups tethered to the area, returning again and again despite their dispersal across the nation. Diagnostic Paleoindian tools have been recovered from sites ranging as far as central Alberta to the northwest, west of the Rocky Mountains in Montana, eastern Colorado, as well as South Dakota, Nebraska, Kansas, and Iowa (Ahler 1977:148, Loendorf et al. 1984:14, Reher and Frison 1980:120). Non-diagnostic artifacts made of KRF have been found across this region and further. “In sum, KRF artifacts are found in varying abundance over an oblong-shaped area which encompasses much of North America” (Loendorf et al. 1984:14).

Subsequent sedentary groups identified after the Paleoindian Period were just as reliant, if not more so, on the lithic material as larger quantities were needed for daily activities within settlements and also for use as a trade item to groups geographically removed from the source area. KRF was the predominant raw material in the

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majority of Middle Missouri Tradition sites within the Dakotas, no matter the distance to the quarry areas. However, in later Coalescent Tradition sites local materials were preferred over KRF (Ahler 1977:148, Lehmer 1971:77, Johnson 1984:294). KRF makes up the majority of non-local material in the Naze Site, 32SN240, (east central North Dakota) where “the high density of good quality KRF flaking debris represents quantities only available in the primary source area [in western North Dakota]” (Picha and Gregg 1987:207). KRF has been recovered in Hopewellian sites as far east as Ohio and, in testament to reciprocal flow of trade goods, Pacific Coast shell has been recovered from nearby site 32DU508 (Ahler 1986: 20-22, Braun et al. 1982:65-85, Clark 1984a:174). These data clearly indicate a wide trade network that has implications for research questions within the Lynch Quarry Site boundary, within the primary source area for KRF, and externally as KRF is found in more diverse regions of the nation. Conrad found that KRF distributions in western Illinois support a “down-the-line” model for trading the stone (Conrad 2004:178).

“The lithic extraction and tool production activities which occurred at the KRF quarries had a direct and indirect effect on prehistoric people who lived in a 3.7 million square kilometer area in North America. The importance of KRF as a key lithic source continued throughout the entire post-glacial period. The quarries, workshops, camps, and other sites in the KRF primary source area provide the ideal focal point for studying and monitoring many aspects of 10,000 years of cultural process and cultural evolution throughout a large part of North America” (Ahler 1986:110).

Other Precontact Quarry Sites in the United States

Comparison of the Lynch Quarry Site to other precontact stone quarry areas across the United States is a difficult task. This sub group, quarries, is an underrepresented site type in the NHL program with only two holding National Historic Landmark status. The first and most distant precontact quarry site is the Mauna Kea Adz Quarry near Hilo, Hawaii. The Mauna Kea site was listed in 1962 and, as a result, little specific information is available. The second precontact quarry is the Silver Mound Archeological District in Wisconsin, which was designated as a National Historic Landmark in 2006 and is an excellent example of precontact quarrying. This district, where Hixton Silicified Sandstone (HSS) was quarried, comprised 700 acres of land (Carr and Boszhardt 2004:4). This is similar in size to the Lynch Quarry; however, the estimated 1,000 features across Silver Mound are one-twentieth of the estimated number visible at the Lynch Quarry Site.

The distribution of KRF is broad, reaching an estimated 3.7 million square kilometers, as noted above. Yet, this was only one of many quarry areas across the United States used during precontact times. Quarry sites like Spanish Diggings in Wyoming, Crescent Hills in Missouri, Flint Ridge in Ohio, and the Alibates Quarry in Texas had major precontact activity for tool stone procurement (Arnold 1987:102-103). Used and exhausted tools were discarded at quarry sites where new tools from the local material were then created and exported. Based on data from the Lynch Quarry Site and other KRF source sites, these discarded tools made from non-local materials can be traced to their original sources, which will, in turn, help researchers infer precontact group movements, settlement patterns, and mobility strategies. Quarry sites thousands of miles apart then can be seen as key loci in a system, with a continuous flow of peoples across our national landscape as areas were used to varying degrees. Research questions concerned with how and why fluctuations in use-intensity occurred can help interpret the precontact cultural and physical landscape in North America through time.

A second research path can focus on access to quarry areas. Open access and controlled access systems of quarry extraction have different archeological signatures (Binford 1979). Controlled access implies ownership, at some level, for the quarry area, and permission would need to be granted for access. Alternatively, production by the controlling group could mean trade networks were established and the raw material was used

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as a type of currency. Open access implies groups could utilize quarry areas with no restrictions and production for exchange would have occurred as needed on an individual group basis. In discussing these questions Binford (1979) suggests a model where two types of lithic procurement were possible: direct or embedded. Direct access describes a system where groups made logistically organized trips for the specific purpose of acquiring raw material. Embedded procurement describes a system in which raw material was gathered secondarily on a trip made for one or more separate purposes (i.e. nut gathering). Tantalizing evidence for both types of system has been recovered from site 32DU508 near the Lynch Quarry Site, and it is likely that each strategy was predominant at various times in precontact history (Ahler 1986: 108). If, as Binford suggests, embedded procurement is the general rule among hunter-gatherers, why is there evidence in the KRF quarries to suggest direct procurement was taking place? The Lynch Quarry, being the largest of all of the KRF quarries, is likely to yield valuable information pertaining to such research questions and could help guide interpretation of other quarry sites across the nation.

Criterion 6: Developing the American Economy, Peopling Places, Expanding Science and Technology and Transforming the EnvironmentDeveloping the American Economy

Procurement of superior quality lithic raw material was a high priority for Paleoindian flint-knappers. KRF was used for personal tool kits and as a trade good. Paleoindian groups ranged over the vast expanse of the United States, adapting to new environments and terrain (see Kelly 1995, Kent 1984). These early hunter-gatherer groups initially had little knowledge of the areas they passed through, gaining valuable information about food and raw material resources as they mapped onto the landscape. These groups discovered and established the KRF quarry area as a landmark to which they would return again and again. Likely, this knowledge-base as much as the tool stone itself was traded and exchanged as small bands met and diverged over thousands of years. Thus the interaction between groups encouraged the non-local distribution of Knife River flint across the nation.

In a study on production and distribution of lithic materials in the American Southwest, Findlow and Bolognese (1984) found a cost-benefit analysis to be applicable to precontact quarry extraction. They report that inserting data from a specific quarry into a larger picture of quarries across the United States would clarify the whole range of economic factors that influenced quarry usage. Mathematical formulas to assess exchange and production rates have been developed (see Renfrew 1975, Findlow and Bolognese 1984, and Torrence 1986). Not only can these studies be applied to the spatial distributions of lithic materials in regard to exchange, they can also address changes in the economy of precontact peoples through time. As seen in the pilot study of site 32DU508, KRF quarry area usage peaked during the Paleoindian and Middle Plains Woodland periods. Study of these changes in production and distribution of KRF is ideally suited to helping assess the overall production trends for quarry sites across the United States.

Comparing the archeological record from the quarries with ethnographic information gives strength to studies of exchange on the Plains. Precontact people living in large village sites along the Missouri River obtained KRF from the quarries through transport via waterways. Researchers chronicled the lives of remaining members of those tribes (Denig 1976 [1930]; Wilson 1987 [1917]). The ethnographic data, specifically trade and economic shifts, can help explicate the archeological evidence at the Lynch Quarry Site and other KRF source area sites (Clark 1984a). As group territories and cultural boundaries shifted after European contact, did the access to the quarries change? When demand for Knife River flint tapered off after the introduction of European trade goods, the quarry areas may have been used for other purposes. Similarly, biological and environmental information from ethnographic accounts can be supported in the geomorphic record to determine if changing climate may

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have affected Knife River flint extraction and distribution. Combining many avenues of research makes information gathered at the Lynch Quarry more powerful than the archeological data alone.

Peopling Places

The earliest Paleoindian groups moved across the continent, migrating into unfamiliar territory during a time of changing climatic conditions. Among the numerous challenges they faced, finding sources of lithic material for their tools was paramount, and their frequent and repeated visits to the Knife River flint quarries, as well as the wide geographic distribution of diagnostic KRF Paleoindian tools, shows this resource's importance to their tool kits. These groups brought with them lithic tools made from non-local materials such as Miocene flint from the Sentinel Butte formation (southwestern North Dakota), Hartville Uplift Chert (Wyoming), Obsidian Cliff obsidian (Wyoming), and Lang Chert (Southwestern South Dakota). Many of these tools, either at the end of their use-life or broken, were abandoned at the Knife River flint quarries as new tools were made (Photos 20 and 21). By tracing the exotic materials back to their sources, researchers can determine their directionality of movement. Because population was probably quite small during the Paleoindian period, hunter-gatherer groups may have occasionally encountered each other across the large expanse of the Plains. Thus, when groups did interact, they potentially exchanged information as well as material goods. The evidence for frequent extraction from the Lynch Quarry and others in the area speaks to how valuable a resource the lithic material was for Paleoindian groups. Because of the quality and accessibility of KRF, it is reasonable to speculate that multiple groups visited the quarries simultaneously, and that the area may have served as a seasonal gathering location.

In contrast, during the Middle Woodland quarrying resurgence, territorial ranges were likely more defined and the quarries restricted. The need or desire of non-local groups to access the lithic material may have prompted development of exchange networks and interactions between those groups and groups with more direct control over, or access to, the quarries.

Other lines of research pertinent to the Peopling Places theme include the spirituality of place and gender role differences in various quarry activity areas. Some tribes believe that quarries are spiritual places or the stone itself holds some supernatural power (Arnold 1987:116). Archeological evidence of spiritual constructs is difficult to identify but the existence of cairns and prayer circles near the quarry may be linked to these religious concepts. On the secular level, surrounding the quarry itself are several activity areas, including camps and workshops. Evidence may be recovered of gender-based tasks within each activity area (see Hastorf 2001, Spector 1983) as well as group dynamics in mobility patterns (Surovell 2000). Whether spiritual or functional in nature, the structured activity areas at the quarry periphery suggest a formal approach to the extraction process in the Paleoindian and Archaic periods.

Expanding Science and Technology

The Lynch Quarry Site can clearly contribute valuable data on lithic technology. Changes in form imply changes in function for most lithic tools. Variability of tool design through time, from the large Paleoindian spear heads to the smaller, more varied Archaic dart points and even smaller Woodland projectile point styles, reflects important technological innovations, which also include the introduction of the atlatl and bow and arrow. To be sure, some morphological changes may have been driven by individual or group styles as much or more than technological goals, but other changes in tool morphology must have been necessitated by functional imperatives derived from the subsistence demands placed on hunter-gatherers.

Lithic reduction sequences have been analyzed in detail with experimental archeological studies recreating how precontact knappers made tools from raw material. Large archaeological sites with massive amounts of lithic

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debitage led to the utilization of a method for the study of large quantities ofdebitage called “aggregate or mass analysis” (Ahler 1989), which when applied to quarry sites, has been extremely useful in determining lithic reduction sequences over time. The pilot study on site 32DU508 revealed a shift from economical reduction of raw material (to conserve the material) to one of wasteful reduction sequences. Because of this shift, numerous questions were posed to identify the reasons for the pronounced differences between the lithic deposits. Were group dynamics placing stresses on the lifestyle and health of their members? During periods of sickness and death, technological knowledge can be lost as noted in the study of pottery forms (Lehmer 1971:176). Is the same process chronicled in the lithic reduction sequences at 32DU508? What economical or environmental shifts occurred to spur this shift in knapping behavior? Why would wasteful practices become more, instead of less, attractive to knappers as KRF accessibility and quantities dwindled? Was this phenomenon isolated to 32DU508 or was it a general pattern throughout the KRF primary source area? Were non-local groups making incursions into the quarries without permission? Had controlled access to the quarries collapsed? The answers may possibly lie in the Lynch Quarry Site deposits and could revolutionize how we think quarry areas were used over time.

“[F]ull understanding of the spatial and temporal patterning in technological strategies for a major lithic source such as KRF will require many years of research utilizing a wide range of innovative analytical methods keyed to the particular source area. While expanding the study outward from the quarry area proper, we should seek explanations for the patterns in terms of changes in both local and more distant cultural systems responsible for the use of the Knife River flint quarries. The quarry area proper provides a focal point from which to investigate broad patterns of cultural change that are relevant to the full scope of human development in the North American continent” (Ahler and VanNest 1985:195).

Transforming the Environment

The environmental implications from precontact quarrying are unknown. Precontact plants and animals living in the region may have been displaced or eradicated as human groups drew from the local subsistence base during quarrying activity. Modifications of the land through digging the pits may have exposed areas to accelerated wind and water erosion. These areas of research can be pursued through paleo-environmental reconstruction based on study of the Lynch Quarry Site’s intact soil stratigraphy. All of these types of studies can be developed for or applied to quarry sites across the nation to assess human impacts to precontact ecosystems. KRF has already inspired original research comparing degrees of patination (chemical weathering of the stone’s surface) as a relative determination of age (Christensen 1991, Ahler, Root, and Feiler 1994).

Geomorphology and geochronology of the Oahe Formation (archeological-bearing sediments) may have far reaching applicability to the region (Kay 1984:221-223, Waters and Kuehn 1996:495). The sites around Lake Ilo have intact portions of this formation, but due to water activity, the geomorphologic record is convoluted. If the formation can be found in the intact deposits of the Lynch Quarry, geomorphology could be used to assess changes in climate conditions through time in this region. Other, larger regional studies can be conducted as similar stratigraphic records are compiled, giving a holistic view of the Plains environmental biome.

“Locating, mapping, and dating local and regional expressions of the Oahe Formation lithostratigraphic sequence are of importance for predicting the location and age of buried archaeological deposits in the region. Kay [1984] notes that the paleoenvironmental studies should investigate a broad array of indicators including not only pollen but also opal phytoliths, vertebrate, insect, and mulluscan faunas, and pedological information” (Ahler 1986:19).

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Conclusion

The Lynch Quarry Site, encompassing over one square mile of land, is a visually stunning display of precontact quarrying efforts and is the type-site for KRF procurement. The distinctive lithic material is found in sites across the central United States, signifying its importance to precontact peoples. The Lynch Quarry Site was used throughout precontact times with peak usage during the Paleoindian Period and again during the Middle Woodland Period. Paleoindian groups traveled over the entire continent, mining quarries for high quality lithic material. KRF has been transported over thousands of miles for individual group use as well as trade. During the Middle Woodland, increased sedentism in Plains groups led to shifts in social and economic patterns. KRF flint was used heavily by nearby groups as well as groups far-removed from the primary source area. These groups relied on a widely established trade network reaching as far away as Ohio to the east and to the Rocky Mountains to the west.

The intact deposits at the Lynch Quarry Site hold vast potential for research in archeology, geomorphology, settlement systems, and cultural variation. Study of the quarry site will expand the knowledge base about nomadic groups' migratory patterns and group dynamics as they relate to raw material procurement. Hypotheses of controlled versus open access to quarry sites can be tested for intersite and intrasite temporal and spatial variation. The nationally significant information potential for the Lynch Quarry Site is incalculable and, as more analytic techniques are developed, more research avenues will be explored.

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Previous documentation on file (NPS):

- ☐ Preliminary Determination of Individual Listing (36 CFR 67) has been requested.
☐ Previously Listed in the National Register.
☒ Previously Determined Eligible by the National Register.
☐ Designated a National Historic Landmark.
☐ Recorded by Historic American Buildings Survey: #
☐ Recorded by Historic American Engineering Record: #

Primary Location of Additional Data:

- ☐ State Historic Preservation Office
☐ Other State Agency
☐ Federal Agency
☐ Local Government
☐ University
☐ Other (Specify Repository):

10. GEOGRAPHICAL DATA

Acreage of Property: 693 acres

UTM References:	Zone	Easting	Northing
A			
B			
C			
D			

Verbal Boundary Description: The [REDACTED] Lynch Quarry Site boundaries coincide with the edge of the terrace landform. The terrace consists of glacial deposits where the Knife River flint cobbles are concentrated. [REDACTED], the extent of the quarry pits and distribution of surface artifacts mark the boundary. Flint-bearing sediments increase in depth as one travels [REDACTED]. Quarrying would have been much easier in the [REDACTED] portion of the site, near the terrace edge.

The [REDACTED] boundary of the Lynch Quarry [REDACTED], following the terrace edge. While surface archeological deposits are nearly continuous between the two sites, the boundary separating the sites is based on depositional history. The Lynch Quarry Site has archeological deposits to a maximum depth of three meters while [REDACTED] is much shallower, extending only 35 centimeters below surface (Loendorf et al. 1984:20).

Boundary Justification: The boundaries of the Lynch Quarry Site are based primarily on the distribution of surface features and artifact distribution across the terrace [REDACTED]. They have been demarcated based on landform, surface expression of features, surface artifact distribution, and historic markers (i.e. roads, fences, etc.). Each of these factors has created, over various portions of the site's perimeter, a well-defined limit for the site boundary. The historic markers are utilized for simplicity in demarcating the boundary due to the nearly ubiquitous distribution of surface artifacts in this region. This site's main body is comprised of the quarry pits and associated activity areas. The areas not readily associated with either the Lynch Quarry or the other nearby quarry sites are considered "non-site" areas for easier research parameters. Instead of drawing an

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United States Department of the Interior, National Park Service

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arbitrary line between such higher profile sites, existing historic markers are utilized. The boundary's current extent was established in 1982 and is recognized by the State Historical Society of North Dakota as the true extent of the site.

DRAFT

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11. FORM PREPARED BY

Name/Title: Damita Hiemstra
Staff Archaeologist

Address: Metcalf Archaeological Consultants, Inc.
P.O. Box 2154
Bismarck, North Dakota 58502

Telephone: 701-258-1215

Editorial Contributions:

Patrick O'Brien, Metcalf Senior Staff Archaeologist
Paul Picha, Chief Archeologist State Historical Society of North Dakota

Photographs: Mike Frohlich, State Historical Society of North Dakota (Artifacts and Site Photos)
Terry Wiklund, North Dakota Department of Transportation (Aerial Photos)

Date: June 2008

Edited by: Ricah Marquez
Erika Martin Seibert
National Park Service
National Historic Landmarks Program
1849 C St., NW (2280)
Washington, DC 20240

Telephone: (202) 354-2011

Vergil Noble
Midwest Archeological Center
National Park Service
Robert V. Denney Federal Building, Room 474
100 Centennial Mall North
Lincoln, NE 68508

Telephone: (402) 437-5392

NATIONAL HISTORIC LANDMARKS PROGRAM
August 26, 2010

LYNCH QUARRY SITE

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National Historic Landmarks

Property Name: Lynch Quarry Site

PAGE REMOVED

Item Number: Figure 1**Page:****REASON:** Photo may reveal location of the site.

The location of this property is restricted information under law:

National Historic Preservation Act of 1966, as amended, section 304, 16 U.S.C. 470w-3(a)

- *Confidentiality of the location of sensitive historic resources*

Section 304

[16 U.S.C. 470w-3(a) – Confidentiality of the location of sensitive historic resources]

(a) The head of a Federal agency or other public official receiving grant assistance pursuant to this Act, after consultation with the Secretary, shall withhold from disclosure to the public, information about the location, character, or ownership of a historic resource if the Secretary and the agency determine that disclosure may –

- (1) cause a significant invasion of privacy;
- (2) risk harm to the historic resources; or
- (3) impede the use of a traditional religious site by practitioners.

[16 U.S.C. 470w-3(b) – Access Determination]

(b) When the head of a Federal agency or other public official has determined that information should be withheld from the public pursuant to subsection (a) of this section, the Secretary, in consultation with such Federal agency head or official, shall determine who may have access to the information for the purpose of carrying out this Act.

[16 U.S.C. 470w-3(c) – Consultation with the Advisory Council]

(c) When the information in question has been developed in the course of an agency's compliance with section 106 or 110(f) of this Act, the Secretary shall consult with the Council in reaching determinations under subsections (a) and (b) of this section.

A redacted version was included with the series, from the state and year for this property that was sent to the Federal Records Center and from there to the National Archives.

A full version was sent in the address restricted series to the Federal Records Center and from there to the National Archives.

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Property Name: Lynch Quarry Site

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Property Name: Lynch Quarry Site

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Section 304

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[16 U.S.C. 470w-3(b) – Access Determination]

(b) When the head of a Federal agency or other public official has determined that information should be withheld from the public pursuant to subsection (a) of this section, the Secretary, in consultation with such Federal agency head or official, shall determine who may have access to the information for the purpose of carrying out this Act.

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Property Name: Lynch Quarry Site

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Section 304

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Photograph 1: Aerial from the south looking north over heart of the Lynch Quarry.
Photograph by Terry Wiklund, September 17, 2004.

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Property Name: Lynch Quarry Site

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Item Number: ND_DunnCounty_LQ02**Page:****REASON:** Photo may reveal location of the site.

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- *Confidentiality of the location of sensitive historic resources*

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[16 U.S.C. 470w-3(b) – Access Determination]

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[16 U.S.C. 470w-3(c) – Consultation with the Advisory Council]

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Property Name: Lynch Quarry Site

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Item Number: ND_DunnCounty_LQ03**Page:****REASON:** Photo may reveal location of the site.

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Section 304

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[16 U.S.C. 470w-3(b) – *Access Determination*]

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[16 U.S.C. 470w-3(c) – *Consultation with the Advisory Council*]

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View southeast over pits. Note: fence posts mark anvil stones. Photograph by Mike Frohlich, May 03, 2008.



Close up of an anvil stone with the worn utilized area on the top. Photograph by Mike Frohlich, May 03, 2008.

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Top: Bone finishing tool made from a split bison rib. Bottom: Elk antler tine used for removing flakes from cores. Photograph by Mike Frohlich, May 03, 2008.



Bone awl from a split bison rib. Photograph by Mike Frohlich, May 03, 2008.

LYNCH QUARRY SITE

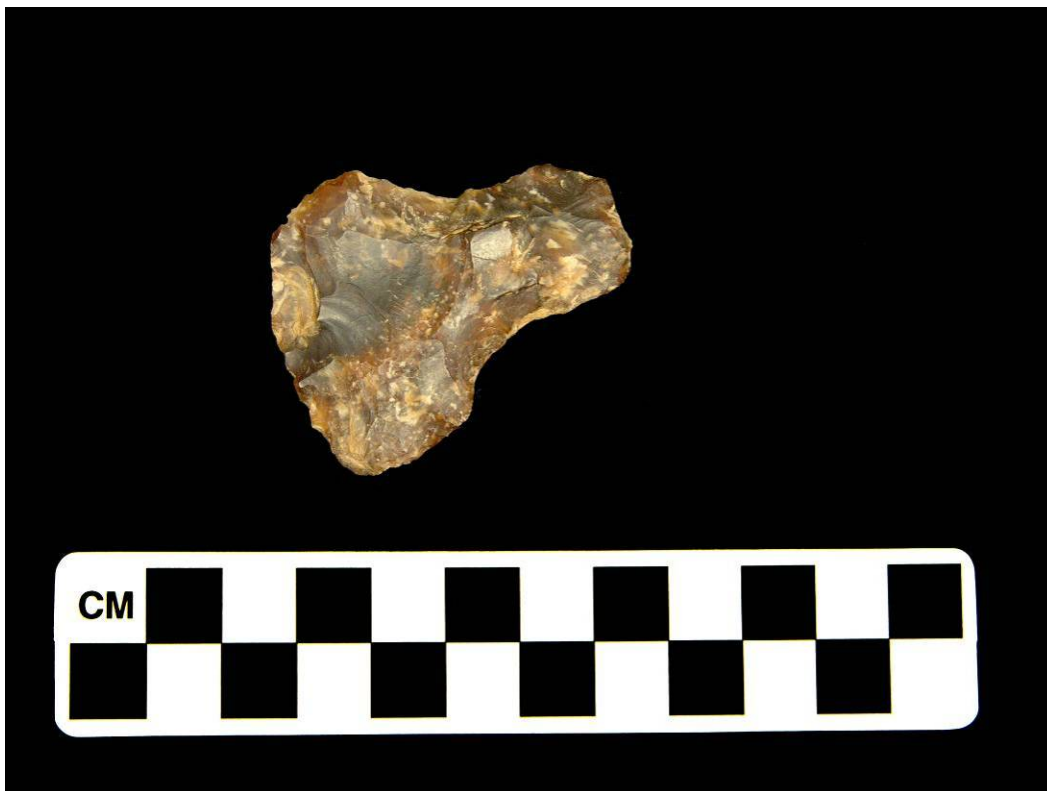
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Core and blade specimens made from KRF representing Paleoindian technology. Photograph by Mike Frohlich, May 03, 2008.



Reworked hafted drill, now a scraper made from KRF. Photograph by Mike Frohlich, May 03, 2008.

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Points made from non-KRF material discarded at the Lynch Quarry Site, dating to Late Precontact and Plains Village periods. Photograph by Mike Frohlich, May 03, 2008.



Specimens of non-KRF materials discarded at the Lynch Quarry Site (from left to right: jasper, petrified wood, porcellanite, and obsidian). Photograph by Mike Frohlich, May 03, 2008.